

C2  
Candid

downstream from the 3' ends of the coding sequences to provide expression of the coding sequence in the chloroplast genome of a target higher plant, and flanking each side of the expression cassette, chloroplast DNA sequences which originate from a plant species the same as or different from the target plant, said sequences being conserved in all higher plants and complementary to the corresponding chloroplast sequences of the target plant, which sequences are also competent of undergoing homologous recombination with said complementary sequences of the target plant, whereby stable integration of the heterologous coding sequence into the chloroplast genome of the target plant is facilitated by said homologous recombination of the flanking sequences with the complementary sequences in the target chloroplast genome.

Sub  
C3

4. (Once Amended) The vector of claim 3 wherein the flanking sequences comprise, each one a portion of the intergenic spacer 2 region between the tRNA<sup>Ile</sup> and the tRNA<sup>Ala</sup> genes of the chloroplast genome of a higher plant, which plant is the same as or different from the target higher plant, whereby double homologous recombination with the conserved spacer 2 region in the target plant chloroplast genome is facilitated.

Sub  
D27

C4

86. (Once Amended) A process for stably transforming a target higher plant species which comprises introducing an integration and expression universal vector into the chloroplast genome of the target plant species and allowing the transformed plant to grow, the vector being competent to stably transform the chloroplast of higher plants and comprising an expression cassette which comprises, operably joined, a heterologous DNA sequence coding for a peptide of interest, and control sequences positioned upstream from the 5' and downstream from the 3' ends of the coding sequence to provide expression of the coding sequence in the chloroplast genome of the target higher plant, a heterologous

CH  
Concluded

nucleotide sequence coding for a selectable phenotype, and flanking each side of the expression cassette, chloroplast DNA sequences of a higher plant which comprise each one a portion of the intergenic spacer 2 region between the tRNA<sup>Ile</sup> and the tRNA<sup>Ala</sup> genes of the chloroplast genome, said sequences conserved in all higher plants and competent of undergoing homologous recombination with complementary spacer 2 sequences of heterologous target plant species, whereby stable integration of the heterologous coding sequence into the chloroplast genome of the target plant is facilitated through homologous recombination of the flanking sequences with the complementary spacer 2 sequences of the target plant chloroplast genome.

N.S. see a-n-o-t-b  
Claim 181, line 1, change "176" to -86-.

N.S.  
Claim 183, line 1, change "177" to -123-.

N.S. see a-n-o-t-b  
Claim 184, line 1, delete "stably transformed chloroplast" and replace with -expression cassette-.

N.S. see a-n-o-t-b  
Claim 185, line 1, delete "stably transformed chloroplast" and replace with -expression cassette-.

N.S. see a-n-o-t-b  
Claim 186, line 1, delete "stably transformed chloroplast" and replace with -expression cassette-.

N.S. see a-n-o-t-b  
Claim 188, delete "183" and replace with -187-.

Add the following claims:

C5  
-189. The vector of claim 4 wherein the DNA of the flanking sequences originate from tobacco and the target plant is not tobacco.

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D-7

190. A universal integration and expression vector competent for stably transforming the chloroplast genome of higher plant species which comprises an expression cassette which comprises, operably joined, a heterologous DNA sequence coding for a peptide of interest and control sequences positioned upstream from the 5' and downstream from the 3' ends of the coding sequences to provide expression of the coding sequence in the chloroplast genome of a target higher plant, and flanking each side of the expression cassette, chloroplast DNA sequences which originate from a plant species the same as or different from the target plant, said sequences being conserved in all higher plants and complementary to the corresponding chloroplast sequences of the target plant, which sequences are also competent of undergoing homologous recombination with said complementary sequences, whereby stable integration of the heterologous coding sequence into the chloroplast genome of the target plant is facilitated by said homologous recombination of the flanking sequences with the complementary sequences in the target chloroplast genome and is not directed into a transcriptionally inactive region of the chloroplast genome.

CS  
control

191. A universal integration and expression vector competent for stably transforming the chloroplast genome of higher plant species which comprises an expression cassette which comprises, operably joined, a heterologous DNA sequence coding for a peptide of interest and control sequences positioned upstream from the 5' and downstream from the 3' ends of the coding sequences to provide expression of the coding sequence in the chloroplast genome of a target higher plant, and flanking each side of the expression cassette, flanking DNA sequences which originate from a plant species the same as or different from the target plant, said sequences being conserved in all higher plants and complementary to the corresponding chloroplast sequences of the target plant, which

sequences are also competent of undergoing homologous recombination with said complementary sequences of the target plant which are homologous to a spacer sequence of the target chloroplast genome, which sequence is conserved in the chloroplast genome of different plant species, whereby stable integration of the heterologous coding sequence into including a transcriptionally active region of the chloroplast genome of the target plant is facilitated through homologous recombination of the flanking sequences with the homologous sequences in the target chloroplast genome.

CS  
confid.

192. A universal integration and expression vector competent for stably transforming the chloroplast genome of higher plant species which comprises an expression cassette which comprises, operably joined, a heterologous DNA sequence coding for a peptide of interest and control sequences positioned upstream from the 5' and downstream from the 3' ends of the coding sequences including a transcriptionally termination region to provide expression of the coding sequence in the chloroplast genome of a target higher plant, and flanking each side of the expression cassette, flanking DNA sequences which originate from a plant species the same as or different from the target plant, said sequences being conserved in all higher plants and complementary to the corresponding chloroplast sequences of the target plant, which sequences are also competent of undergoing homologous recombination with said complementary sequences of the target plant which are homologous to a spacer sequence of the target chloroplast genome, which sequence is conserved in the chloroplast genome of different plant species, whereby stable integration of the heterologous coding sequence into the chloroplast genome of the target plant is facilitated through homologous recombination of the flanking sequences

C5  
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193. A universal integration and expression vector competent for stably transforming the chloroplast genome of higher plant species which comprises an expression cassette which comprises, operably joined, a heterologous DNA sequence coding for a peptide of interest and control sequences positioned upstream from the 5' and downstream from the 3' ends of the coding sequences to provide expression of the coding sequence in the chloroplast genome of a target higher plant, and flanking each side of the expression cassette, flanking chloroplast DNA sequences each one a portion of a synthetic spacer 2 region between the tRNA<sup>Ile</sup> and tRNA<sup>Ala</sup> genes, said sequences being conserved in all higher plants and complementary to the corresponding chloroplast sequences of the target plant, which sequences are also competent of undergoing homologous recombination with said complementary sequences of the target plant which are homologous to a spacer sequence of the target chloroplast genome, which sequence is conserved in the chloroplast genome of different plant species, whereby stable integration of the heterologous coding sequence into the chloroplast genome of the target plant is facilitated through homologous recombination of the flanking sequences with the homologous sequences in the target chloroplast genome.

194. The process of claim 86 wherein the flanking sequence which originate from an original other than the target plant and comprise, each one a portion of the intergenic spacer 2 region between the tRNA<sup>Ile</sup> and the tRNA<sup>Ala</sup> genes of the chloroplast genome, whereby double homologous recombination with the conserved spacer 2 region in the target chloroplast genome is facilitated.

195. The process of claim 194 wherein the DNA of the flanking sequences originate from tobacco and the target plant is not tobacco.

SUB 57  
C5  
cont'd

196. A process for stably transforming higher target plant species which comprises introducing a universal integration and expression vector competent for stably transforming the chloroplast genome of higher plant species which comprises an expression cassette which comprises, operably joined, a heterologous DNA sequence coding for a peptide of interest and control sequences positioned upstream from the 5' and downstream from the 3' ends of the coding sequences to provide expression of the coding sequence in the chloroplast genome of a target higher plant, and flanking each side of the expression cassette, flanking DNA sequences which originate from a plant species the same as or different from the target plant, said sequences being conserved in all higher plants and complementary to the corresponding chloroplast sequences of the target plant, which sequences are also competent of undergoing homologous recombination with said complementary sequences of the target plant which are homologous to a spacer sequence of the target chloroplast genome, which sequence is conserved in the chloroplast genome of different plant species, whereby stable integration of the heterologous coding sequence into the chloroplast genome of the target plant is facilitated through homologous recombination of the flanking sequences with the homologous sequences in the target chloroplast genome and is not directed into a transcriptionally inactive region of the chloroplast genome.

197. A process for stably transforming higher target plant species which comprises introducing a universal integration and expression vector competent for stably transforming the chloroplast genome of higher plant species which comprises an expression cassette which comprises, operably joined, a heterologous DNA sequence coding for a peptide of interest and control sequences positioned upstream from the 5' and downstream from the 3' ends of the coding sequences to provide expression of the coding sequence in the

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chloroplast genome of a target higher plant, and flanking each side of the expression cassette, flanking DNA sequences which originate from a plant species the same as or different from the target plant, said sequences being conserved in all higher plants and complementary to the corresponding chloroplast sequences of the target plant, which sequences are also competent of undergoing homologous recombination with said complementary sequences of the target plant which are homologous to a spacer sequence of the target chloroplast genome, which sequence is conserved in the chloroplast genome of different plant species, whereby stable integration of the heterologous coding sequence into including a transcriptionally active region of the chloroplast genome of the target plant is facilitated through homologous recombination of the flanking sequences with the homologous sequences in the target chloroplast genome.

198. A process for stably transforming higher target plant species which comprises introducing a universal integration and expression vector competent for stably transforming the chloroplast genome of higher plant species which comprises an expression cassette which comprises, operably joined, a heterologous DNA sequence coding for a peptide of interest and control sequences positioned upstream from the 5' and downstream from the 3' ends of the coding sequences to provide expression of the coding sequence including a transcriptionally termination region in the chloroplast genome of a target higher plant, and flanking each side of the expression cassette, flanking DNA sequences which originate from a plant species the same as or different from the target plant, said sequences being conserved in all higher plants and complementary to the corresponding chloroplast sequences of the target plant, which sequences are also competent of undergoing homologous recombination with said complementary sequences of the target plant and which are homologous to a spacer sequence of the target chloroplast genome, which

sequence is conserved in the chloroplast genome of different plant species, whereby stable integration of the heterologous coding sequence into the chloroplast genome of the target plant is facilitated through homologous recombination of the flanking sequences with the homologous sequences in the target chloroplast genome.

199. A process for stably transforming higher target plant species which comprises introducing a universal integration and expression vector competent for stably transforming the chloroplast genome of higher plant species which comprises an expression cassette which comprises, operably joined, a heterologous DNA sequence coding for a peptide of interest and control sequences positioned upstream from the 5' and downstream from the 3' ends of the coding sequences to provide expression of the coding sequence in the chloroplast genome of a target higher plant, and flanking each side of the expression cassette, flanking DNA sequences which originate from a plant species the same as or different from the target plant, said sequences being conserved in all higher plants and complementary to the corresponding chloroplast sequences of the target plant, which sequences are also competent of undergoing homologous recombination with said complementary sequences of the target plant which are homologous to a spacer sequence of the target chloroplast genome, which sequence is conserved in the chloroplast genome of different plant species, whereby stable integration of the heterologous coding sequence into the chloroplast genome of the target plant is facilitated through homologous recombination of the flanking sequences with the homologous sequences in the target chloroplast genome and the vector does not include a transposon.

200. A stably transformed plant of claim 188 which is a progeny of the plant.